

NO: R128

COUNCIL DATE: June 29, 2015

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## REGULAR COUNCIL

TO: **Mayor & Council** DATE: **June 23, 2015**  
FROM: **General Manager, Engineering** FILE: **5600-43**  
SUBJECT: **City of Surrey Water Distribution System Annual Report for 2014**

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## RECOMMENDATION

The Engineering Department recommends that Council:

1. Receive this report as information; and
2. Authorize staff to forward to the Medical Health Officer in accordance with the requirements of the *Drinking Water Protection Act* a copy of this report and the related report titled "City of Surrey Water Distribution System Annual Report for 2014", a summary of which is attached to this report as Appendix I.

## INTENT

This report represents the 2014 Annual Report of the City of Surrey Water Distribution System, which has been prepared in accordance with the requirements of the *British Columbia Drinking Water Protection Act*.

## DISCUSSION

As a water system operator, the City monitors on an on-going regular basis the quality of the water we deliver to our customers. Section 15(b) of the *British Columbia Drinking Water Protection Act* (provincial regulation) requires water suppliers to report the results of water quality monitoring in accordance with the requirements described in Section 11 of the *Act*. The City satisfies this requirement through the preparation of an annual written report that is made available to water consumers and is forwarded to the Medical Health Officer as information. The City, in cooperation with the Fraser Health Authority (FHA) and Metro Vancouver, has developed a water quality monitoring and reporting plan for the City's water distribution system. A protocol document sets out monitoring parameters, the reporting structure and response plans to emergency situations such as incidents of high bacteria counts or other types of contamination, should they occur.

A Summary of the City of Surrey Water Distribution System Annual Report for 2014 is attached to this report as Appendix I. The full report will be available for viewing on the City's website and forwarded to the Medical Health Officer subject to consideration of and approval by Council of the recommendations contained in this report.

The City purchased all of its water in 2014 from Metro Vancouver (i.e., the Greater Vancouver Water District). Metro Vancouver (MV) monitored all of the parameters of the City's source water within the Metro Vancouver system from the alpine reservoirs of the North Shore Mountains through the MV distribution system to the delivery points in Surrey.

Within the City distribution system, samples are taken on a regular basis and tests are conducted on those samples for such things as bacteria and turbidity (cloudiness), as well as chemical and physical parameters unique to distribution systems. Weekly sampling takes place at 51 water quality sampling stations located strategically across the City's water distribution system. These samples are collected by both City and Metro Vancouver staff and are forwarded to the Metro Vancouver testing laboratory in Burnaby where the samples are subjected to tests which include temperature, turbidity, chlorine residual, and bacteria.

No bacterial contamination (total coliform or E.coli bacteria) was found in any of the 3,032 water samples collected and analyzed in 2014 as specified in the B.C. Drinking Water Protection Regulation, Schedule A. In addition, 73 audit samples taken by the Fraser Health Authority during the course of the year confirmed the Metro Vancouver laboratory test results for Surrey.

### **Chlorine Levels**

As in previous years, portions of the City's distribution system have experienced from time to time lower than desirable chlorine residual values. The lower than desirable chlorine residual values may be attributed to mainline segments which are "dead ended"; the mains are not looped or interconnected with other segments of mainlines. The City, where possible is requiring looping of existing dead-ended mains either as new development occurs or through Capital Projects. This process will be an ongoing program that will take years to complete. The operational and/or maintenance procedures in these affected areas have been reviewed with Metro Vancouver staff and representatives from the Fraser Health Authority who agree with the City's strategy for managing water quality in these areas.

Where weekly sampling test results revealed the potential for bacterial growth beyond acceptable limits, the Engineering Department's maintenance crews flushed the related distribution pipes so as to decrease the potential for such growth. Low chlorine residuals, low flow demands, and the absence of circulation at or near dead-ends in the system are characteristics of areas where bacterial growth may occur and result in the need for more frequent flushing than in the remainder of the system. Where practical, either through the annual Capital program or in conjunction with land development projects, extensions to dead-end water mains are constructed to complete "loops" so as to eliminate the "dead ends".

Through our continued efforts with proactive maintenance, unidirectional water main flushing, and Capital and Land Development projects, looping and interconnecting of dead-end mains, the water quality in areas that were marginal has been improved. In addition, we continue to liaise with Metro Vancouver, as part of the initiative of the Drinking Water Management Plan, to review the operation of Metro Vancouver's re-chlorination facilities to look at the opportunity of increasing chlorine residual at some of Metro Vancouver's connection points. Furthermore, a trial project has been initiated to install automatic flushing units in areas of marginal water quality to help improve chlorine residual results.

All 2014 water samples from the City's water distribution system were in compliance with the Guidelines for Canadian Drinking Water Quality and the British Columbia Drinking Water Protection Regulation.

### **Cross Connection Control Program**

The City has established a Cross Connection Control (CCC) program for all Industrial, Commercial and Institutional (ICI) facilities and some Multi-Family Dwellings to maintain our high quality water. This program is a joint effort between the City and water customers to protect the City's water system from contamination originating on private property. Contaminants may enter the City's water system through cross connections during a backflow event when the pressure in the City's water system is low or negative. Such low or negative pressure conditions exist when there is a water main breakage or extraordinary demand such as during a major firefighting event. The risk that private plumbing systems pose to the City's water distribution system can be reduced by the installation, testing and regular maintenance of backflow preventers. In addition, all new construction that introduces a potential cross connection hazard requires the installation of a backflow preventer, as regulated by the British Columbia Building Code and the Surrey Waterworks Cross Connection Control By-law.

In 2014, the number of backflow preventers registered with the City increased by 5%, to a total of 9,701 backflow preventers as of December 31, 2014. The City's CCC program requires that the owner test the backflow device annually to confirm that it is working properly. In 2014, the City achieved over 96% compliance with this requirement.

### **CONCLUSION**

The City remains diligent and proactive in monitoring, operating and maintaining the City's water distribution system to ensure that the City's water customers continue to receive safe and clean drinking water.

Based on the above discussion, it is recommended that Council authorize staff to forward to the Medical Health Officer in accordance with the requirements of the *Drinking Water Protection Act* a copy of this report and the related report titled "City of Surrey Water Distribution System Annual Report for 2014", a summary of which is attached to this report as Appendix I.

Fraser Smith, P.Eng., MBA  
General Manager, Engineering

RAC/JA/TA/KL/DMS/clr

Appendix I - Summary of the City of Surrey Water Distribution System Annual Report for 2014

### **Summary of the City of Surrey Water Distribution System Annual Report for 2014**

In 2014, the City of Surrey purchased all the water that it supplied to City of Surrey residents from Metro Vancouver (i.e., the Greater Vancouver Water District) through three (3) supply feeds. The City's water distribution system is connected to the Metro Vancouver distribution system at the discharge points for six (6) Metro Vancouver water reservoirs and at eleven (11) Metro Vancouver connection chambers located throughout the City.

The City's piped water distribution system is approximately 1,835 Km in length (1% increase from 2013). The network includes water mains, 51 water quality testing stations, 10 pumping stations, 90,046 service connections, (1% increase from 2013), and 61,196 water meters, (4% increase from 2013). Figures 1 and 2, at the end of this appendix, illustrate the water distribution system and water quality testing stations throughout the City.

The City's maintenance program for its water system components includes a regular program of unidirectional water main flushing of all mains in the system at least once every five (5) years. This unidirectional approach to flushing ensures that water from non-flushed mains does not flow into recently flushed mains. The City's maintenance program combined with an ongoing program of water main replacements and water supply controls by Metro Vancouver has eliminated the need for any abrasive, mechanical cleaning of the City's water mains.

Monitoring of the quality of the water within the City's water system is undertaken at fifty-one (51) water-sampling stations located strategically across the City. Weekly samples are collected by both City and Metro Vancouver staff. These samples are tested for temperature, turbidity, chlorine residual, and bacteria at Metro Vancouver's testing laboratory in Burnaby.

In 2014, 15.2% of the City's water operating and maintenance budget was spent on water quality related work. Three thousand and thirty two (3,032) water samples were analyzed with none of the samples indicating any presence of E.coli bacteria and all samples meeting the standards contained in the B.C. Drinking Water Protection Regulation (BCDWPR) and the Guidelines for Canadian Drinking Water Quality (GCDWQ). Seventy three (73) audit samples taken in 2014 by the Fraser Health Authority throughout the system confirmed Metro Vancouver laboratory test results. This is consistent with previous years' results in relation to water samples taken from the City's water system.

The City has established response procedures to deal with water quality issues and for pipe breaks. The procedures incorporate both agency notification and steps for physical repair. Integral to the response procedures are well-defined communication links between City, Metro Vancouver, and Fraser Health Authority (FHA) staff. The City has a response plan for major water emergencies which has been successfully tested in concert with other Metro Vancouver member municipalities.

As in previous years, portions of the City's distribution system have experienced from time to time lower than desirable chlorine residual values. The City continues to work with Metro Vancouver staff and representatives of Fraser Health Authority to review operational and/or maintenance procedures and to determine if improvements should be considered to address areas where lower than desirable residuals were revealed in water samples. Chlorine residuals are monitored throughout the distribution system. In 2014, 71% of the 3,032 samples taken were greater than 0.2 mg/L (increase of 3% from 2013). The remaining 29% of the samples were less than 0.2 mg/L. Where water sample test results revealed (through the use of heterotrophic plate counts, HPC) bacterial growth beyond acceptable limits, staff took action to flush the related sections of water main to address the problem. These areas of the water distribution system also typically exhibit low water demand and/or circulation restrictions.

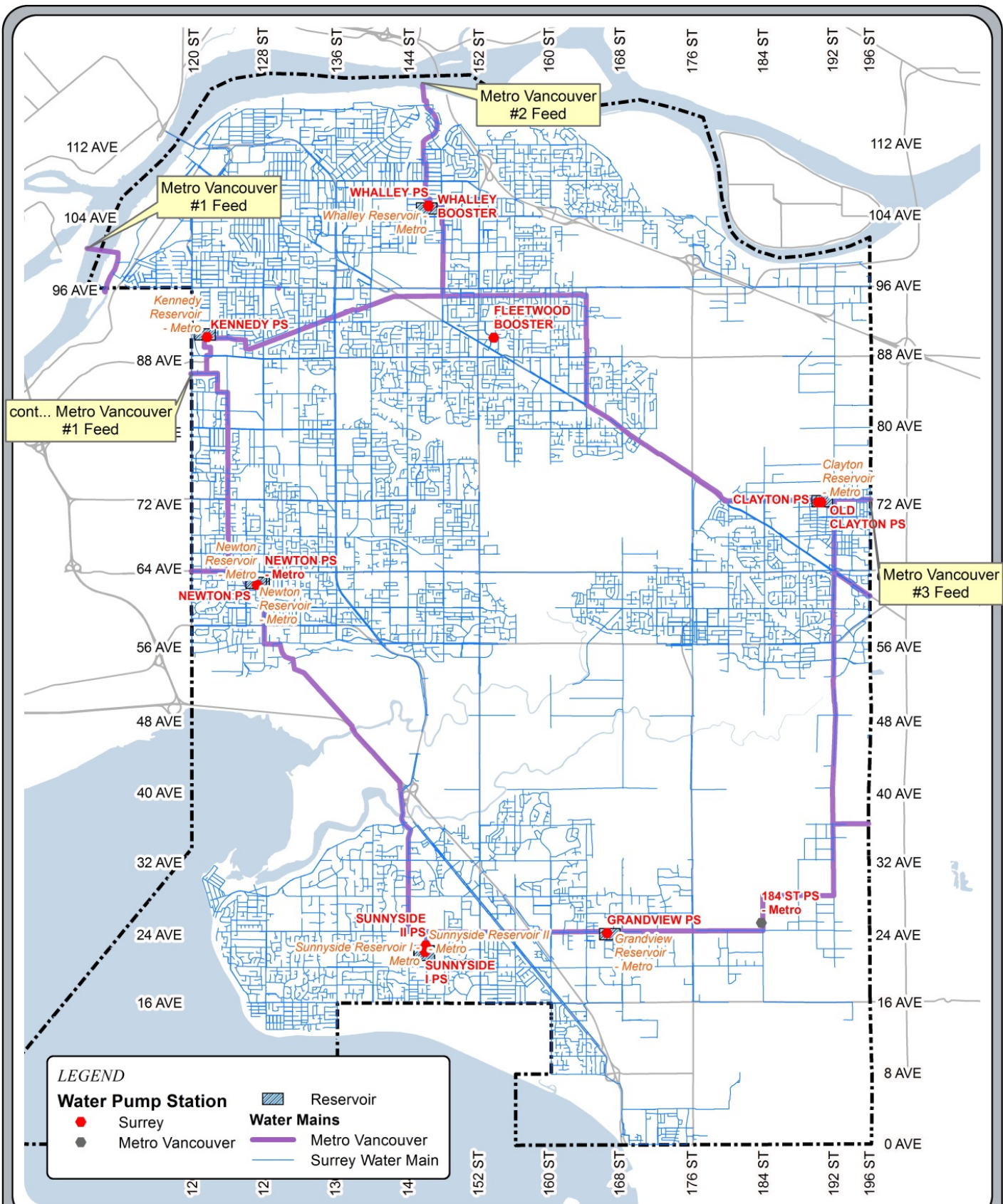
Most Canadian drinking water supplies maintain free chlorine residuals in the 0.04- 2.0 mg/L range in the distribution system. At these concentrations, taste and odour related to chlorine or its by-products are generally within the range of acceptability for most consumers. However, individual sensitivities in the population are widely variable; sensitive individuals may detect it at levels as low as 0.6 mg/L.

Metro Vancouver's laboratory technicians perform quarterly tests on water within the City's system for disinfection by-products (Haloacetic Acids and Trihalomethanes), and semi-annual tests for pH and select metal concentrations. Sampling sites for these tests were selected in accordance with a monitoring and reporting plan established between the City and Metro Vancouver staff. The results of these tests demonstrated that water quality remained within acceptable levels, as recommended in the Guidelines for Canadian Drinking Water Quality.

Except for a few circumstances where fire hydrants were opened without authorization or were damaged in accidents, there were no incidences of tampering or vandalism with the City's water system in 2014. System security includes lighting, locks, and alarms at pump stations as well as back flow prevention check valves on industrial and commercial service connections. The City also has a cross-connection program to guard against contaminants entering the system from private properties, as discussed in more detail below. All of these preventative measures provide protection against tampering, vandalism and contamination.

The City monitors water service connections to industrial and commercial businesses on an on-going basis through a cross-connection control (CCC) program that includes a database of backflow preventers. In 2014, the number of backflow preventers registered with the City increased by 5 %, for a total of 9,701 assemblies as of December 31, 2014. The City's CCC program requires that the owner test the backflow control device annually to confirm that it is working properly. In 2014, the City achieved over 96% compliance with this requirement.

The City remains diligent in maintaining its water distribution system to high quality standards and in ensuring the delivery of high quality water to the City's residents and businesses.

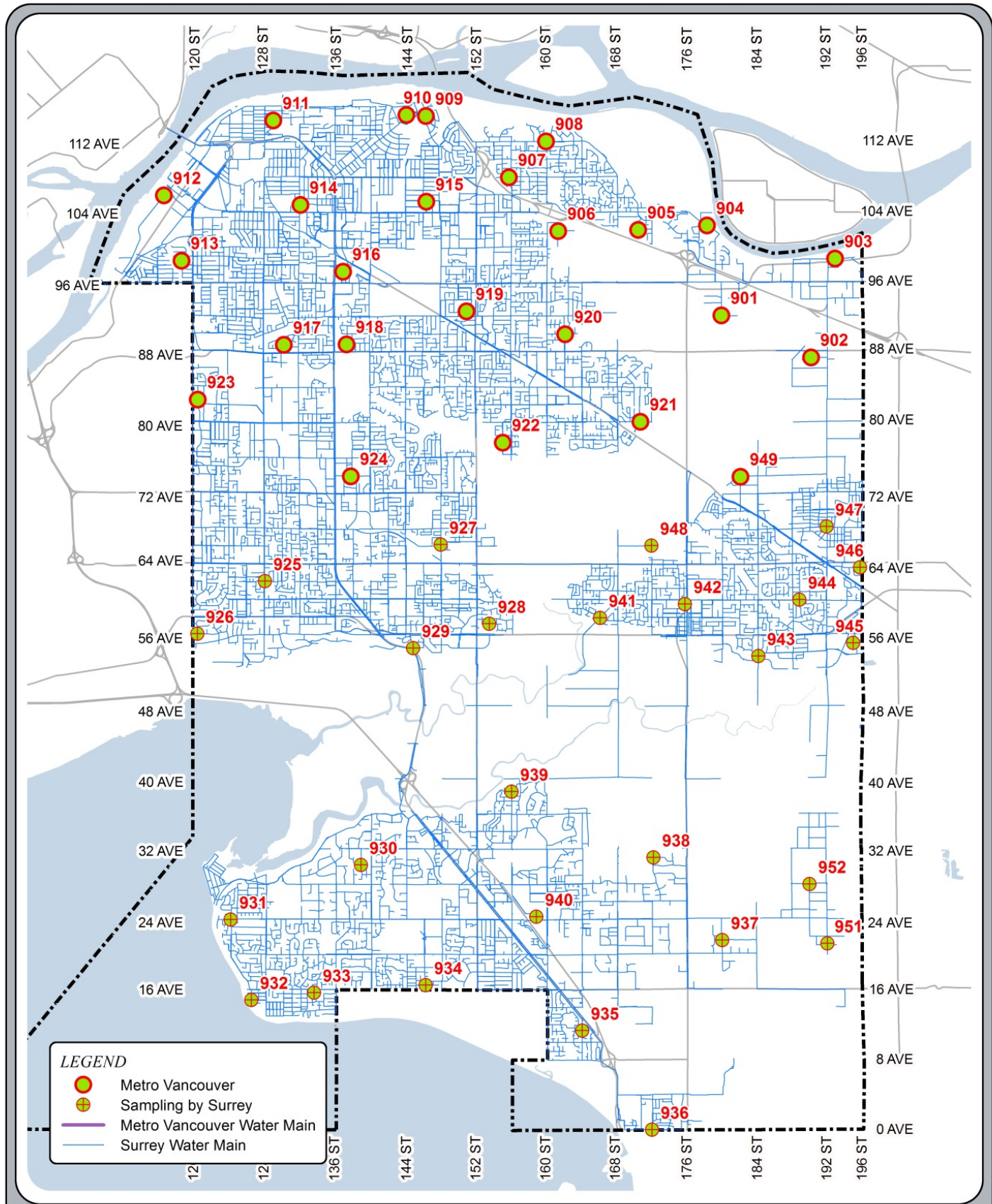


**Fig 1: WATER DISTRIBUTION SYSTEM**  
**(Supply Feeds, Reservoirs, Mains and Pump Stations)**

0 470 940 1,880 2,820 3,760  
 Meters  
 SCALE: 1:110,000

ENGINEERING OPERATIONS  
 CITY OF SURREY

Source: L:\ENG\Water\GIS\maps\wtr\PumpStationsReservoirs.mxd  
 Cartographer: k9p Date: 03-Jun-2015 © City of Surrey



Source: L:\ENG\Water\GIS\maps\wtrMainSamplingSites\_A\_reporttoFraser.mxd  
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